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PATHOGENIC VARIATION AND VIRULENCE OF ISOLATES OF PSEUDOMONAS  
SYRINGAE pv. PHASEOLICOLA IN MALAWI

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Halo blight of beans incited by *Pseudomonas syringae* pv. *phaseolicola* is one of the most important diseases of beans in Malawi. Despite the importance of halo blight in Malawi, no information is available as to which pathotype exist in the country. Therefore, a study was carried out to determine the pathogenic variation and virulence of thirty two isolates of *Pseudomonas syringae* pv. *phaseolicola* collected from different bean growing districts of Malawi.

Pathotype determinations were based on both foliage and pod reaction of the five bean cultivars, Red Mexican UI3, Red Mexican UI34, Great Northern 123, Jubila, and Namajengo. Cultivars Nasaka and Montcalm were included as susceptible and resistant controls, respectively. Standard isolates of race 1 and race 2 were included for comparison. Thirteen Malawian isolates plus race 1 isolate were grouped as pathotype 1, Sixteen Malawian isolates plus race 2 isolate were determined to be pathotype 2, two isolates made up pathotype 3 and one isolate represented pathotype 4 (Table 1).

The isolates were also ranked for virulence on the basis of (1) the diameter of water-soaked lesions caused on pods and (2) number of water soaked lesions induced on spray inoculated leaves of the susceptible cultivar Nasaka. The most virulent isolates were those of pathotype 2, while isolates belonging to pathotype 1 were least virulent (Tables 2 and 3).

The Malawian isolate in pathotype 4 also differed from the rest of the Malawian isolates in terms of colony morphology. It was the only isolate to produce rough colonies in artificial media. Both smooth and rough colony types have been reported for *P. syringae* pv. *phaseolicola* (Adam and Pugsley, 1934).

The presence of pathogenic variation in *P. syringae* pv. *phaseolicola* is well documented and the present study defines four different pathotypes of this pathogen in Malawi, based on differential pathogenic reaction on seven bean varieties. However, the possibility of other Malawian pathotypes existing cannot be ruled out as the isolate collection trip did not cover all bean growing districts and for most of those districts visited, we were unable to travel to very remote places. The realization that there is extreme variation in pathogenic potential of this organism is very important to the development of widely adapted halo blight resistant bean varieties for Malawi farmers.

Table 1: Foliage reaction of bean cultivars to inoculation with several isolates of Pseudomonas syringae pv. phaseolicola.

	<u>Reactions of Bean Cultivar</u> <sup>a,b</sup>							Designated
Halo Blight Isolate	NAS	UI3	UI34	GN123	JUB	NAM	MONT	Pathotype
Race 1, HB1, HB3, HB5, HB7, HB8, HB9, HB10, HB11, HB12, HB13, HB23, HB29, HB40	S	R	R	R	R	R	R	1
Race 2, HB14, HB15, HB16, HB17, HB18, HB19, HB20, HB24, HB25, HB26, HB27, HB34, HB36, HB37, HB38, HB39	S	S	S	S	S	S	R	2
HB4, HB6	S	R	R	R	S	R	R	3
HB35	S	R	R	R	S	S	R	4

<sup>a</sup>NAS= Nasaka, UI3=Red Mexican UI3, UI34=Red Mexican UI34, GN123=Great Northern 123, JUB=Jubila, NAM=Namajengo, MONT=Montcalm.

<sup>b</sup>S=Susceptible reaction-stunting of inoculated plants, wilting and drooping of primary leaves usually followed by systemic chlorosis of top leaves; R=resistant reactions-brown necrotic lesions and absence of any visible symptom.

Table 2: Average diameter and range of water-soaked spots induced by 34 isolates of Pseudomonas syringae pv. phaseolicola on pods of bean cultivar Nasaka.

Pathotype	1	2	3	4
# of isolates	14	17	2	1
average diameter	3.7	4.7	4.2	5.0
range	2.3-4.9	2.8-7.0	4.0-4.4	

Table 3: Average number and range of water-soaked lesions induced by 34 isolates of Pseudomonas syringae pv. phaseolicola on leaves of bean cultivar Nasaka.

Pathotype	1	2	3	4
# of isolates	14	17	2	1
Average # of lesions	26	427	187	620
range	10-98	170-709	125-249	